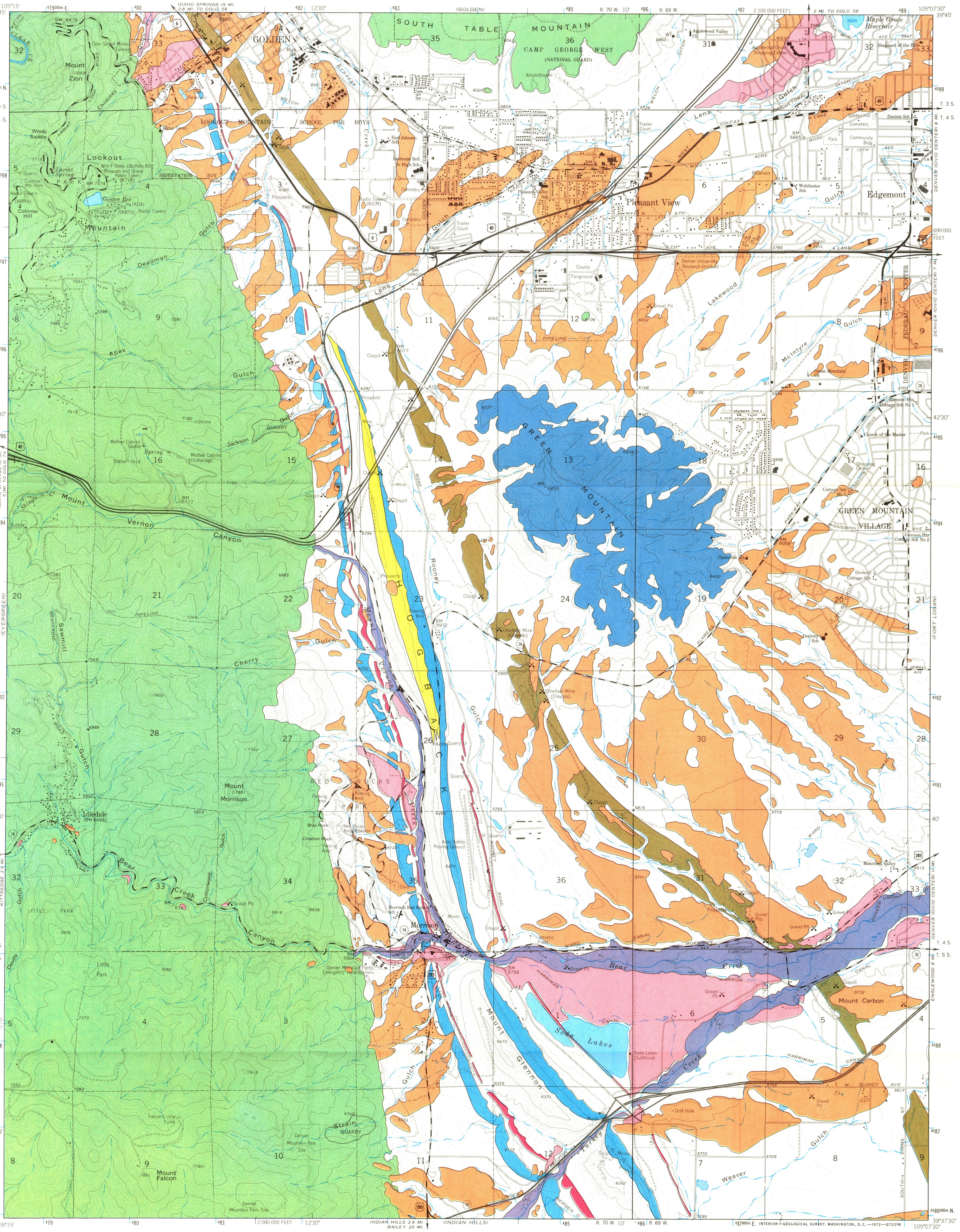
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

FOLIO OF THE
MORRISON QUADRANGLE, COLORADO
MAP I-790-D



Base from U.S. Geological Survey, 1965
Photorevised in 1972
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 13, shown in blue

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Contacts derived directly or by interpretation from geologic map of Morrison quadrangle (I-790-A)

SOURCE AREAS FOR COMMODITIES

GRAVEL – Well-graded (nonuniform-sized particles); contains boulders more than 3 feet in size near mountains, but smaller in eastern part of area. Composed chiefly of metamorphic rocks. Probably would have low loss in Los Angeles abrasion test. Good aggregate for concrete, bituminous mix, subbase, and road metal. Generally about 20 feet thick

GRAVEL – Well-graded; contains boulders similar to above deposit. Composed chiefly of metamorphic rocks. Probably would have low loss in Los Angeles abrasion test. Good aggregate for concrete, bituminous mix, subbase, and road metal. Generally about 20 feet thick, but mostly lies below water table. Commonly lies beneath 5-10 feet of sand and silt containing organic material

GRAVEL – Well-graded; contains boulders larger than 3 feet in size near mountains, but smaller to east. Composed chiefly of metamorphic rocks. Generally would have higher loss in Los Angeles abrasion test than above deposits; also has thick white coating of calcium carbonate on stones in upper part of deposits, and some decomposed stones. Good aggregate for base course, subbase, and road metal. Most deposits probably not suitable for bituminous mix or for concrete aggregate. About 5-30 feet thick

GRAVEL – Well-graded; well-cemented. Composed chiefly of granitic and metamorphic rocks, except for some volcanic rocks in lower part. Layers of conglomerate as thick as 50 feet are interbedded with layers of siltstone and claystone. In some layers, stones are decomposed and are easily crushed in hands. Potential source of aggregate for base course, subbase, and road metal. Most deposits probably not suitable for bituminous mix or concrete aggregate

CRUSHED AGGREGATE AND RIPRAP – Potential source in shoshonite (potassium-rich basalt) on South Table Mountain and in metamorphic rocks. All metamorphic rocks are potential source; however, unweathered rocks are closest to the surface in the deepest canyons. Two areas are shown in canyons where quarrying is now in progress. In part of area shown in mountains, weathered rocks and surficial deposits cover potential quarry sites. Probably would have low loss in Los Angeles abrasion test. Will require blasting and crushing. Also good source of lichen-covered landscape rock

Crushed aggregate – Source areas provide excellent aggregate for concrete, bituminous mix, subbase, and road metal

Riprap – Metamorphic rocks are being used and shoshonite was used for riprap. Each contains sound hard rock that is free from defects which would cause it to disintegrate through erosion, slaking, or freeze-and-thaw process

CLAY AND COAL – Interbedded with sandstone in mapped area called Laramie Formation

Clay – Sublow- and low-duty refractory; now used for manufacture of brick and tile. Several fairly continuous layers ranging in thickness from more than 20 feet to a pinchout are mined. Although whole formation is shown on map, most clay layers lie in lower (western) part. P.C.E. (pyrometric cone equivalent) of two samples (Van Sant, 1959, p. 50-51) ranged from 17-23, which is sublow- to low-duty refractory

Coal – Subbituminous. Although whole formation is shown on map, coal is confined to lower (western) 200 feet. As many as four beds, each as thick as 5 feet, were mined between about 1870 and 1945 from about 15 small mines

CLAY – High- to super-duty refractory; now used for manufacture of fire brick and building brick, refractory tile, scorifiers, muffles, and porcelain articles. Mapped area called lower part of South Platte Formation. Several fairly continuous layers ranging from 15 feet to a pinchout are mined. P.C.E. of about 12 samples (Van Sant, 1959, p. 25-49) ranges from 30-34, which is high- to super-duty refractory. The clay-bearing unit in the South Platte pinches out south of Alameda Parkway (Waagé, 1961, p. 69)

SAND – Western mapped bed is called Lyons Sandstone; eastern mapped bed is upper part of South Platte Formation. Both beds contain medium to fine firmly cemented sand containing iron cement and concretions; however, some beds are free of iron cement and concretions. Sand from South Platte Formation south of quadrangle is now used for molding in foundries. Lyons Sandstone is not now being mined in Denver area and possibly is unsuitable because of iron content and conglomeratic beds in upper and lower parts

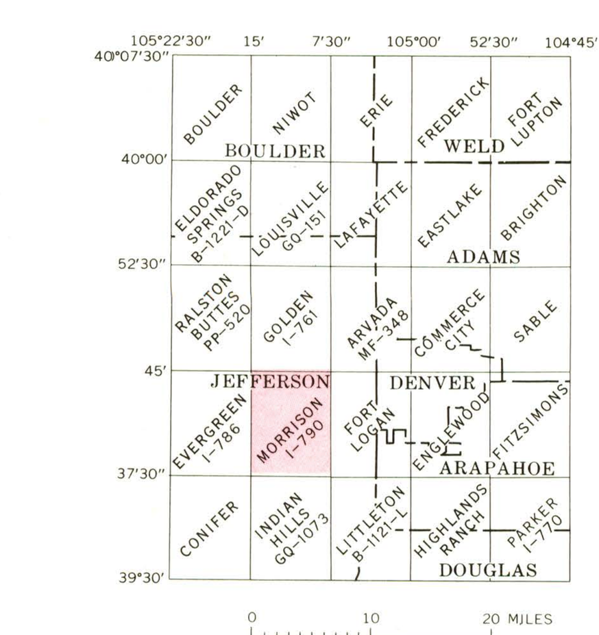
LIMESTONE – Western bed, called Forelle Limestone Member of the Lykins Formation, is pink, wavy bedded, dense, sandy, and hard; it contains a fairly large amount of silica which possibly is detrimental for use as flux. Eastern bed, called Fort Hays Limestone Member of the Niobrara Formation, is gray, dense, hard, and contains some clay; it now is being mined south of the quadrangle for use as a flux in foundry work. Fort Hays Limestone Member and a calcareous shale east of it are now mined for manufacture of cement in other parts of Colorado where dip is low enough and a large enough area is available for stripping

REFERENCES

Scott, G. R., 1972, Geologic map of the Morrison quadrangle, Jefferson County, Colorado: U.S. Geol. Survey Misc. Geol. Inv. Map I-790-A.

Van Sant, J. N., 1959, Refractory-clay deposits of Colorado: U.S. Bur. Mines Rept. Inv. 5553, 156 p.

Waagé, K. M., 1961, Stratigraphy and refractory clayrocks of the Dakota Group along the northern Front Range, Colorado: U.S. Geol. Survey Bull. 1102, 154 p.



INDEX SHOWING LOCATION OF MORRISON QUADRANGLE

MAP SHOWING POTENTIAL SOURCE AREAS FOR NON-METALLIC MINERAL RESOURCES, MORRISON QUADRANGLE, JEFFERSON COUNTY, COLORADO

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